

CLAIMS

1. Process for manufacturing a refractory material, characterized in that it comprises the following steps:

- 5 a) deposit on the surface of a substrate or in a mould a first dispersion containing at least one metallic compound chosen from among borides, carbides and borocarbides containing at least one transition metal, in powder form, and a resin with a coke mass content equal to  
10 at least 30% after carbonization;
- b) dry the resulting deposit;
- c) cross-link the resin present in this deposit;
- d) carbonize this resin under an inert atmosphere;
- 15 e) cover the said deposit with a second dispersion containing silicon in powder form and a binder; and
- f) heat the deposit made in step e) to a  
20 temperature equal to at least the melting temperature of silicon, under an inert atmosphere,

steps a) and b) possibly being repeated one or more times before going onto step c).

- 25 2. Process according to claim 1, characterized in that the metallic compound is chosen from among hafnium, zirconium and titanium borides and carbides.

3. Process according to claim 1 or claim 2, characterized in that the resin has a coke mass content equal to at least 45% after carbonization.

5        4. Process according to any one of the above claims, characterized in that the resin is chosen from among phenolic resins and furanic resins.

10       5. Process according to any one of the above claims, characterized in that the metallic compound present in the first dispersion is in the form of particles with an average diameter of less than or equal to 5  $\mu\text{m}$ .

15       6. Process according to any one of the above claims, characterized in that the binder present in the second dispersion is an aqueous solution of about 5% (m/m) of carboxymethylcellulose.

20       7. Process according to any one of the above claims, characterized in that, in step a), the substrate on which the first dispersion is deposited is a part composed of graphite or a composite material comprising a matrix and fibers in carbon and/or silicon  
25       carbide.

30       8. Process according to any one of the above claims, characterized in that the metallic compound is hafnium boride and in that the hafnium boride and resin contents of the first dispersion are such that at the end of step d), the mass ratio between hafnium boride

and carbon derived from carbonization varies from 18:1 to 1:1, taking account of the mass ratio of coke in the said resin after carbonization.

5           9. Process according to claim 8, characterized in that the silicon content of the second dispersion is such that, after step e), the molar ratio between the carbon derived from carbonization of the resin and the deposited silicon is equal to 1 or is only very  
10 slightly different from 1, taking account of the mass per unit area of the deposit made with this second dispersion.

15           10. Use of a process according to any one of claims 1 to 9 for making coatings intended to protect a carbon-based part from corrosion at very high temperatures.

20           11. Use according to claim 10, characterized in that the carbon-based part is composed of graphite or a composite material comprising a carbon or silicon carbide matrix and carbon and / or silicon carbide fibers.

25           12. Protective coating containing a metallic compound comprising hafnium boride and silicon carbide, characterized in that it can be obtained by a process according to any one of claims 1 to 9.

13. Protective coating according to claim 12, characterized in that it contains 50 to 95% (m/m) of hafnium boride and 5 to 50% (m/m) of silicon carbide.

5           14. Use of a protective coating according to claim 12 or claim 13 to protect a carbon-based part from corrosion at very high temperatures.

10           15. Use according to claim 14, characterized in that the carbon-based part is composed of graphite or a composite material comprising a matrix and fibers in carbon and/or silicon carbide.